Biological Notes on Two Species of Chrysopidae (Neuroptera)

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Chrysopa cockerelli Banks

Two larvae of this species were taken in March, 1948, already nearly grown. This would indicate that this species develops early in the season. These larvae are "peddlers," carrying trash on the dorsum, entangled in the cuticular spines. The material is of several sorts. Larval exuviae, exoskeletons of prey, bits of dried leaves, strands of vegetable fiber and unidentified material were found, and certain minute fungi grow on the accumulation, giving it a dark color. This mass is not discarded at ecdysis, but the larva molts under the mass, retaining the major portion.

One larva was placed under a binocular microscope and the "pack" carefully removed. For a day or so thereafter the larva was nearly nude, but exoskeletons of prey (aphids) began to appear and at the final molt the cast skin was added so that by the time the larva was ready to pupate, it was again covered with debris. Oddly enough, actual placing of material was never observed in spite of careful watching.

Feeding of the larvae of this species is very similar to that of the much more common *Chrysopa ploribunda* Fitch.

The cocoon of this species is spherical and is covered by the trash of the "pack," and so appears dark in color and inconspicuous. The pupal period was eighteen days. Emergence is by means of a round "lid" as in *ploribunda.*

Chrysopa ploribunda Fitch

Most of the observations made on this species verify the work of numerous others and are not worth repeating, but certain observations on spinning and voracity appear to be of interest.

At maturity, the larva crawls to a sheltered place and prepares to spin its cocoon. Crannies in leaves of bark are usually chosen. The larva spins with the tip of the abdomen, which is moved back and forth in a manner analogous to the movements

of the head in spinning caterpillars. Withycombe (1924, pp. 369–371) has shown that the source of the silk is the modified malpighian tubules.

A few loose strands are tied first over the whole surface in loose loops. Within this preliminary structure, the larva curls up with the head turned in toward the abdomen. The tip of the abdomen is then directed outward and is moved freely, in movements involving the three or four terminal segments. In this way silk is laid down in short figures of eight patterns, as far as the insect can reach without uncurling. From time to time the larva rolls slightly, continuing to spin as it turns. In this way all parts of the cocoon receive about the same amount of silk. It should be noted that the outer supporting strands are double, caused by the circumstance that in spinning these strands the larva touches the tip of the abdomen to the surface on which it rests, and then to adjacent surfaces, subsequently returning the abdomen to the original position. One strand is spun with the outward movement and another with the return movement, spinning being continuous.

The loose preliminary strands form the outer part of the cocoon, while the denser inner part is formed during the revolving process described above. The inner portion, while closely woven, is not thick and the curled up larva is visible after the cocoon is complete. After spinning is complete, the prepupal condition is assumed, lasting from three to seven days before pupation occurs.

Aphids (*Aphis helichrysi* Kalt.) were used in experiments on food habits with the larvae of this species. These aphids occur in small colonies on the tips of the food plants. It is rather difficult to determine the exact number of aphids eaten, since the growth of the colony in some cases nearly equals the rate of feeding by *Chrysopa*. Third instar larvae depleted a colony in two or three days, destroying it. Very small second instar larvae, however, did not bring such a colony under control. From this it is believed that a colony of this species of aphid can support one *Chrysopa* larvae without being exterminated.

It is inexact to count the exoskeletons of the aphids on the bottom of the container without carefully determining which are

carcasses and which are normal exuviae of the aphids; hence notes on the number of aphids eaten by one larva are not as clear cut as might be desired, but it can be stated that a colony of twenty or more aphids (as of the time of collection) was destroyed in forty-eight hours by third instar larvae as a rule. Individual observations indicate that from seven to fourteen large aphids may be eaten by one third instar *Chrysopa* larva without stopping.

Using the aphid colony as a population unit, it was ascertained that a third instar *Chrysopa* larva will destroy three or four colonies of this species of aphid during the six or eight days that comprise the length of this final instar. This indicates a predator of great efficiency.

It also becomes apparent that the third instar of *Chrysopa ploribunda* is the most effective by far, mainly because of its larger size.

Literature Cited

Withycombe, C. L. 1924. Some aspects of the biology and morphology of the Neuroptera. With special reference to the immature stages and their possible phylogenetic significance. Trans. Ent. Soc. London 1924: 313–411.

Current Entomological Literature

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Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia and the University of Pennsylvania, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the year 1951 unless otherwise noted. Continued papers, with few exceptions, are recorded only at their first installment.

For other records of general literature and for economic literature, see the Bibliography of Agriculture, Washington, and the Review of Applied Entomology, Series A, London. For records of papers on medical entomology see Review of Applied Entomology, Series B.

Note: The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the List of periodicals and serials published in our January and June issues. The number of the volume, and in some cases, the part, heft, &c. is followed by a colon (:). References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to Neotropical species, and not so indicated in the title, have the symbol (S).

Papers published in Entomological News are not listed.

GENERAL—Andrews, H. W.—Louis Felix Henri Audcent. [29] 63: 99–100 (Obit.). **Aubert, J.**—L'origine et l'evolution des insectes. [Bull. Soc. Vaudoise Sci. Nat.]